

REMARKS

I. Introduction

By the present Amendment, claims 1-3, 5-7, 11, 13, 18, 20, and 21 have been amended. Claims 9 and 17 have been cancelled without any prejudice or disclaimer to the subject matter recited therein. Claims 22 and 23 are newly presented for consideration. Accordingly, claims 1-8, 10-16, and 18-23 are now pending in the application. Claims 1-3, 5-7, 11, 13, 18, 20, and 21 are independent.

II. Office Action Summary

In the Office Action of January 23, 2008, claims 1-12, 20, and 21 were rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 6,980,846 issued to Hardy et al. ("Hardy") in view of U.S. Patent No. 5,479,537 issued to Hamashima. Claims 13-19 were rejected under 35 USC §103(a) as being unpatentable over Hardy in view of Hamashima, and further in view of U.S. Patent No. 5,668,474 issued to Heid. These rejections are respectfully traversed.

III. Rejections under 35 USC §103

Claims 1-12, 20, and 21 were rejected under 35 USC §103(a) as being unpatentable over Hardy in view of Hamashima. Regarding this rejection, the Office Action alleges that Hardy discloses a method for acquiring image data from a subject with an MRI system, and that the general the components of an MRI system are well known in the art. The Office Action specifically asserts that Hardy discloses an MRI system that acquires a reference data set of a region of interest, such as the motion of the heart or the heartbeat, and then acquires a plurality of free-breathing data sets of the same region of interest. The free-breathing data sets are subsequently

compared with the reference data for use in creating an image of the region of interest. The Office Action indicates that Hardy does not expressly disclose setting a threshold in order to determine which images to reject but notes that such a threshold could easily be set. Furthermore, the Office Action admits that Hardy does not perform a comparison using a similarity coefficient. Hamashima is relied upon for disclosing an image comparison method which uses cross correlation and threshold cutoff values to determine if an image matches a reference image. Hamashima is also indicated as disclosing a direction free, or scalar, coefficient that may be used. In particular, the Office Action indicates that Hamashima discloses differential values that are calculated with respect to two subscript characters, of which either can be set equal to one. In this regard, the Office Action indicates that only one dimension is being considered.

By the present Amendment, Applicants have further amended independent claim 1 to define an inspection apparatus that includes a controller for controlling a pulse sequence that applies a radiofrequency magnetic field and a magnetic field gradient to a living body that has been placed in a static magnetic field in order to determine a nuclear magnetic resonance signal produced from the body. In order to achieve this result, the controller performs the following functions. First, in a state where the body is not exhaling or inhaling, the controller controls a first pulse sequence to detect the nuclear magnetic resonance signal and acquire a reference projection of an imaging section for monitoring the respiratory motion of the body. Next, during breathing, the controller controls execution of one of the first pulse sequence to detect the nuclear magnetic resonance signal and acquire a projection of the imaging section to monitor the state of the body during breathing. The controller further repeats a second pulse sequence to detect the nuclear magnetic

resonance signal to acquire an image of the imaging section at predetermined repetition time intervals. Finally, the controller collects the nuclear magnetic resonance signals to reconstruct an image of the imaging section in the second pulse sequence based on a similarity coefficient between the projection and the reference projection. According to independent claim 1, the similarity coefficient is in the form of a scalar value, and the projection and reference projection are one-dimensional in nature. Furthermore, the first pulse sequence is treated as the reference pulse and repeated in order to obtain an average for the projections of the imaging section acquired from the nuclear magnetic resonance signals detected.

According to the newly incorporated features, the present invention addresses certain complications associated with acquisition of the reference projection when the heart is included is included in an echo-acquired section. More particularly, presence of the heart will cause significant changes in the projection as a result of heartbeats. Accordingly, the pulse sequence is repeatedly executed in order to measure a corresponding number of echoes. The echoes for one heartbeat are then averaged in order to remove adverse influences of the heartbeat. See paragraph [0067] of the published application.

Applicants' review of the cited references has failed to reveal any disclosure or suggestion for the newly incorporated features. For example, Applicants' review of Hardy suggests an ECG synchronized imaging technology. However, Hardy does not appear to provide any disclosure or suggestion for the nuclear magnetic resonance signals being detected by repeating the first pulse sequence. Likewise, Hamashima appears to disclose the image to be compared being cut from the input image, and the reference image being passed through different filters. Heid discloses the pulse sequence in which the readout magnetic field gradient and the

pulse-encoding magnetic field have alternating polarities. However, neither of these references provides disclosure for the nuclear magnetic resonance signals being detected by repeating the first pulse sequence to obtain an average of projections of the imaging section.

It is therefore respectfully submitted that independent claim 1 is allowable over the art of record.

The remaining independent claims (2, 3, 5-7, 11, 13, 18, 20, and 21) have all been amended to recite the feature of obtaining an average of projections of the imaging sections acquired from the nuclear magnetic resonance signals detected being obtained by repeating the first pulse sequence as the reference projection. Accordingly, these claims are also believed to be allowable over the art of record.

Claims 4, 8, 10, 12, 14-16, 19, 22, and 23 depend from these claims, and are therefore believed allowable for at least the reasons set forth above with respect to the independent claims. In addition, these dependent claims each introduce novel elements that independently render them patentable over the art of record.

IV. Conclusion

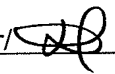
For the reasons stated above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a Notice of Allowance is believed in order, and courteously solicited.

If the Examiner believes that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

AUTHORIZATION

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 520.42912X00).

Respectfully submitted,
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